residues 40 to 65, inclusive, shown in SEQ ID NO: 1, is replaced with an amino acid residue which is volumetrically larger than the replaced amino acid residue.

29. The protein of claim **28**, wherein said replacement occurs at the protein's residue 43.

30. The protein of claim **28**, wherein said replacement occurs at the protein's residue 52.

31. The protein of claim **28**, wherein said replacement occurs at the protein's residue 53.

32. The protein of claim **28**, wherein said replacement occurs at the protein's residue 54.

33. The protein of claim **28**, wherein said replacement occurs at the protein's residue 55.

34. The protein of claim **28**, wherein said replacement occurs at the protein's residue 59.

35. The protein of claim **28**, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

36. The protein of claim **29**, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

E1 Cont.

37. The protein of claim **30**, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

38. The protein of claim **31**, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

39. The protein of claim **32**, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

40. The protein of claim **33**, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

41. The protein of claim **34**, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

42. An *E. coli* RecA protein having enhanced DNA binding activity compared to said protein's wildtype, wherein a naturally occurring amino acid residue located within said protein's residues 40 to 65, shown in SEQ ID NO: 1, inclusive, but excluding said protein's residues 47 and 51 (SEQ ID NO: 1, residues 8 and 12), is replaced with an aromatic amino acid residue.

43. The protein of claim **42**, wherein said replacement occurs at the protein's residue 40.

44. The protein of claim **42**, wherein said replacement occurs at the protein's residue 42.

45. The protein of claim **42**, wherein said replacement occurs at the protein's residue 44.

46. The protein of claim **42**, wherein said replacement occurs at the protein's residue 50.

47. The protein of claim **42**, wherein said replacement occurs at the protein's residue 56.

48. The protein of claim **42**, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

49. The protein of claim **43**, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

E1 cont.

50. The protein of claim **44**, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

51. The protein of claim **45**, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

52. The protein mutant of claim **46**, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

53. The protein mutant of claim **47**, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

54. An *E. coli* RecA protein having enhanced DNA binding activity compared to said protein's wildtype, wherein a naturally occurring amino acid residue located at said protein's residues 47 or 51, shown in SEQ ID NO: 1 (residues 8 or 12) is replaced with a tryptophan residue.

Comments

The additional claims are submitted in response to the Examiner's comments during interviews that the claims would be allowable if drawn solely to *E. coli* RecA proteins instead of to *E. coli* RecA proteins and their homologs. As noted below, Applicant does not concede that the claims drawn to *E. coli* RecA protein homologs are not patentable, and continues to pursue those claims. However, this amendment is intended to provide a set of claims which have been indicated to be allowable by the Examiner. Applicant respectfully requests that the Examiner enter this amendment.

Response to Examiner's Rejections

The Rejections Under 35 U.S.C. § 112, 1st Paragraph

The examiner has rejected claims 1-27 under 35 U.S.C. § 112, first paragraph, because the Examiner considers that the specification does not identify structural characteristics or properties of proteins which are homologous to the *E. coli* RecA protein. However, those of skill in the art understand the term "homologs of RecA" sufficiently that the term is used as a basis for defining other terms. *See, e.g.*, United States Patent No. 6,008,031 to Modrich, *et al.*, col. 23, ll. 64-67. Further, "homologs of RecA" has been used to describe the scope of an invention. *See, e.g.*, United States Patent No. 6,242,211 to Peterson, *et al.*, col. 41, ll. 24-37. Accordingly, Applicant submits that those of skill in the art understand the characteristics of "homologs" of RecA, and that the claims directed to "homologs" of the RecA protein do sufficiently describe the claimed invention.

Further, as the Examiner recognizes, the claims are also drawn to homologs of RecA comprising a "MAW motif homologous to the *E. coli* MAW motif." The MAW motif and the invariant and variant portions of its structure are described in detail in the Specification. (*See, e.g.,* Specification, p. 9, ll. 3-12, Fig. 1; SEQ. ID NO: 1; SEQ. ID NO: 2; *and* SEQ ID NO: 3). Accordingly, Applicant submits that 35 U.S.C. § 112, 1st paragraph is satisfied, and requests that this rejection be withdrawn.

The Rejections Under 35 U.S.C. § 112, 2d Paragraph

The Examiner has also rejected claims 1-27 under 35 U.S.C. § 112, 2d paragraph, on the basis that the "metes and bounds" of the claimed "mutant RecA homolog" comprising a "MAW motif" that is homologous to the *E. coli* MAW motif" are not known and not defined in the specification. As discussed above, the MAW motif and its homologs are well described in the Application, the term "homologs of RecA" is well understood by those of skill in the art. Further, the Application expressly defines a mutant of a RecA homolog:

> "In each of these RecA homolog proteins, the MAW motif is identified as the structural homolog of the *E. coli* RecA MAW motif. (*See* SEQ ID NO: 1; Roca & Cox, *supra*)." (Specification p. 5, l. 22 - p. 6, l. 7).

> "[T]he term '**RecA homolog protein mutant**' as used herein refers to an *E. coli* RecA protein, or a bacterial, eukaryotic, archaeal, or viral homolog thereof, in which the naturally occurring MAW motif has been modified by one or more such replacements of amino acid residues. (Specification p. 6, ll. 15-17; emphasis added).

Because those of skill in the art understand how to identify protein homologs, and because the terms of the claims are otherwise well defined and described within the Specification, Applicant respectfully submits that claims 1-27 are in condition for allowance.

Conclusion

Applicant respectfully submits that claims 1-54 are in condition for allowance and requests that the Examiner issue a Notice of Allowance of these claims.

Respectfully submitted,

Date: 2/28/02

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CERTIFICATE OF TRANSMISSION VIA EXPRESS MAIL UNDER 37 C.F.R. § 1.10

I hereby certify that the above **Response to Fifth Office Action** is being transmitted to the Assistant Commissioner of Patents, Washington, D.C. 20231, via United States Express Mail on the 28th day of February, 2002.

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